Jennifer Stock: Thank you for tuning in to the Ocean Currents podcast. This show was originally broadcast on February 8th, 2007 on KWMR, community radio of West Marin. All elephant seal sounds heard in this podcast are copyrighted to the artist, Jay Salter.

Welcome to Ocean Currents. My name is Jennifer Stock and I bring this show to KWMR once a month where we dive into the big blue and bring the ocean to your community radio. We focus on what's happening out there on our blue planet to learn about discoveries, exploration, research, ocean policy, and ways for us land-based folks to get involved, especially in our national marine sanctuaries. I would for NOAA's Cordell Bank National Marine Sanctuary and two days ago I had the great opportunity to visit it and participate on a monthly monitoring cruise where the sanctuary conducts and studies the oceanographic conditions throughout the year and tracks seabirds and marine mammals.

We left from Bodega Harbor at 6am on the sanctuary program's newest research vessel, the Fulmar, a new 67-foot vessel that reaches speeds of 22 knots and it was quite dark as we motored out, but as we motored out we watched the sunrise above the coastal hills of West Marin and Sonoma county and we encountered the typical coast birds on the way out such as cormorants, a few species of gulls, common murres, and as we headed further offshore we started to see more typical offshore species including shearwaters, kittiwakes, and rhinoceros auklets and just as we began the first transect above Cordell Bank, lo and behold, what did we see Sarah Allen?

Sarah Allen: I suspect you may have seen some elephant seals.

Jennifer Stock: We saw an elephant seal, which brings me back to Point Reyes and the topic for today and my guest today, Dr. Sarah Allen, a marine ecologist and science advisor for the Point Reyes national seashore. Sarah has been studying pinnipeds for some years now and runs the elephant seal and harbor seal monitoring programs here in Point Reyes. Elephant seals are in full force out at the headlands right now. So, welcome, Sarah.

Sarah Allen: Thank you, Jenny for asking me.

Jennifer Stock: Excellent. So, we are in the peak of elephant seal season right now. Can you give us a little snapshot of what's going on out there?

Sarah Allen: It is the absolute peak. We just did a survey this week and we had the highest numbers of the season. About 1,200, that was a direct count, and it's all the animals that we count. I'm sure there are actually more for the population for the season, but that's a direct count and of that there were about 650 females. So, that gives you an idea of how large the population is and it's spread all around Point Reyes Headlands. There are three main colonies and then there are several smaller colonies.

Jennifer Stock: So, I want to take a quick break here to actually let listeners hear what it might sound like out at the headlands right now. So, hold on real tight.

(Seal Sounds)

Jennifer Stock: ...up the coast for us. Why...what happened with the elephant seals? Why were they not on the beaches before the 1970's?

Sarah Allen: Well, they were here. Historically, the whalers who used to hunt for whales also hunted seals for their blubber and they used that blubber for cooking and heating oil, but by the mid-1800's and later 1800's, they were hunted out and they were no longer at Point Reyes and the colony was shrunk down, or the population was shrunk down to a colony on Guadalupe Island, which is off of Baja, and that was less than 1,000 animals. There's some controversy about how narrow that bottleneck was, that genetic bottleneck, but certainly less than 1,000 animals were there and from that narrow, small population and with simple protection provided first by the Mexican government and then by the U.S. government, the current population expanded from and it grew at rates from 8 to 30 percent per year as colonies exploded and they expanded and created new colonies along the coast, extending first from Baja and then to the Channel Islands in southern California.

San Miguel Island is the largest colony in the United States. It has probably 35 to 50,000 elephant seals and then there is a very large colony along Big Sur. This one, interestingly enough, was established within three years. The first year there were just a couple pups born and then by the third year there were 900 pups born. So, that gives you an idea of how rapidly some of these colonies form. Point Reyes was established in around '82. The Farallones in '72, I believe, and Point Reyes has not grown at that fast a rate, but it certainly has grown at 6 to 8 percent per year, mostly by animals that have migrated from nearby colonies, especially Ano Nuevo and the Farallon Islands.

Jennifer Stock: So, originally these animals were hunted for their blubber, their oil, correct?

Sarah Allen: That's correct. One bull elephant seal could yield about 20 to 25 gallons or cooking or heating oil.

Jennifer Stock: Heating oil.

Sarah Allen: That was one of the earlier, non-renewable resources that we used.

Jennifer Stock: That's nice. And so now they've come back and how do you think they re-colonized? Are they just swimming around and looking for parts of the coast that look like the type of habitat that they wanted to colonize and breed at?

Sarah Allen: Well, if you look at Point Reyes headlands, it's a big point sticking out in the ocean. So, any animal that's migrating north is going to bump into it. So, that's not surprising that they would discover Point Reyes and indeed, many of the colonies are on locations like that...the Farallon Islands, all of the islands that are established. Point Reyes is the northernmost breeding colony. There are a couple others north of here, but they're not very large and not very successful and Point Reyes also was used initially by animals, young animals, immatures and what you find is immature animals might come back to a site year after year to molt their fur and then eventually they might establish that as a breeding colony. Often you'll see males in an area first and then females will arrive later.

Jennifer Stock: So, actually let's go through a year of an elephant seal because they are here a couple times throughout the year and there's different animals coming out at different times. So, let's start with this past November-December when they start coming to the shores of Point Reyes. Who's coming out first?

Sarah Allen: In November, it's the beginning of the breeding season and you're right, there are different ages and sexes throughout the year and, in fact, in a well-established colony you'll have elephant seals year-round. So, starting in November males, adult males, will arrive at these colonies and because they have this dominance, hierarchical breeding system, the males are play-fighting or actual, indeed, fighting amongst themselves to establish dominance because the dominant males are the ones that are going to breed with the females and then the females will arrive shortly thereafter. After the earliest pup we have documented at Point Reyes was November 20th, but generally females start arriving in early

December and they start pupping and they pup within a couple days of their arrival and so the peak, as I said, was just last week.

That's when we get the maximum number of females that we count on shore. So, then after you reach that peak, you're starting to see less and less animals and by March, all of the adults are gone and all that's left on the beach are these big, fat weeners and the weeners are actually weened at age 30 days. We call them weeners because they're weened pups, but they're just big, fat. They're living on their fat. When they're born they weigh sixty pounds. When they're weened they weigh up to 300 pounds and they're living on this fat before they eventually go to sea themselves within about 30 days.

Jennifer Stock: And while they're gaining all that weight, both the males and the females are losing a percentage of their weight while on the beaches spending energy on breeding and feeding these pups.

Sarah Allen: That's one of the remarkable physiological facts of elephant seals. It's...they are fasting the whole time they are on shore. They don't go out and feed day to day. They're living off their body fat and they'll be fasting, a female will fast for thirty days, a male, up to three months while they're staying there for the entire breeding season and you're not likely to see and alpha male come back more than one year at a time because it is so energetically costly for a male, but a female will come back year after year giving birth and she'll do that for up to twenty years. The oldest female we recorded at Point Reyes was 22 years old.

Jennifer Stock: Wow. It seems like such a strength to have that reproductive success and maybe that's a good reason why they've come back at such a high rate here in Point Reyes. Just their physiology seems to tell them to reproduce.

Sarah Allen: Well, they're a remarkable animal all the way around. They can fast for long periods. They're at sea for 80 to 90 percent of their life. The only animal that actually has two long migrations within a year. They migrate up to Alaska or west towards Hawaii and Japan covering 12 to 14,000 miles in a single year.

So, after they go back to see, that's what they're doing is they're migrating to the feeding grounds and predominantly males, but not exclusively go up towards Alaska and the Kenai Peninsula and they're feeding along that continental margin and the females tend to go west in this north Pacific transition zone, which is a big current area that's between two large water masses and that area

seems to concentrate prey. So, they're feeding all along that water mass. It's very amazing that we know this information because of new gadgetry that's been attached to seals. Prior to ten years ago we had not a clue where or what they were doing at sea.

Jennifer Stock: Just ten years ago we started to learn where they're feeding. That's amazing.

Sarah Allen: And all of this micro-technology is, indeed, getting smaller and smaller so that it's getting put on albatross and hummingbirds.

Jennifer Stock: Hummingbirds. That's amazing. So, not only are we finding out where they're going after they've been breeding and they're feeding, I understand that there's probably some technology that might be telling us how deep they're going, their depths that they dive to. What are some of the average depths that elephant seals will spend time at?

Sarah Allen: The average depths are about 1,000 feet, but they can dive to greater than a mile. One of the devices attached to an animal actually imploded because the water pressure because the animal dove so deep, but in general, they dive around 1,000 feet. They stay underwater, on average, about half an hour, 45 minutes, but the longest time is about an hour and a half.

Jennifer Stock: That's pretty amazing to think about, the pressure, because most of us when we think of diving down to the bottom of a pool we feel our ears' pressure, the pressure on our ears, but how do they adapt to that pressure?

Sarah Allen: Partly it's that they're...when we dive, the problem is the bends and nitrogen getting into our bloodstream. They don't have that problem because they're storing their oxygen in their muscles and in other parts of their body. So, they're not...they don't get the bends. Another feature that they have is around their ear they have some special chambers for dealing with the pressures. Now, I'm not a physiologist. So, I can't give you the specifics on this, but they are adapted for deep-diving in blood volume storage and oxygen storage.

Jennifer Stock: So, they pretty much expell all the air out of any canals or spaces in their...

Sarah Allen: Yes. Yes.

Jennifer Stock: ...bodies. So, air doesn't compress.

Sarah Allen: Yes.

Jennifer Stock: Amazing. Alright, so the elephant seals that takes you through the breeding season and then after a few months some of them come back. What do they do after feeding out there?

Sarah Allen: Actually, the juveniles start arriving in March to molt their fur because each sex and age class molts at a different time. So, the juveniles start coming onshore to molt in March into April, May. The females return in May to molt and then the males return to molt in June and July and the molt is a big deal for elephant seals. It's called a radical molt and they actually molt their fur in big sheets of...

Jennifer Stock: So they're not like other...

Sarah Allen: ...skin and fur.

Jennifer Stock: ..mammals that will shed continuously. This is an animal that does it all at once.

Sarah Allen: It does it all at once. They stay onshore for about three weeks and you'll see big chunks of skin on the haul-out site where this occurs. This is in great contrast to fur seals and remember, fur seals depend on their fur for insulation at sea and they'll lose individual hairs while they're at sea. They could be at sea for up to two years at a time. Elephant seals have to come on shore to molt and there have been studies that show that the hair follicle actually grows faster when it's in sunlight and heat.

Jennifer Stock: So, is that why because of the hair follicle growing they will come ashore to do this catastrophic...

Sarah Allen: Yes, yes. Energetically, it's very costly and again, they're also fasting during that time.

Jennifer Stock: Okay.

Sarah Allen: But they can drop their metabolic rate when they're onshore by just doing sleep apnea. By holding their breath, their blood pressure drops, their heart rate drops, and they can save up to 40% of their metabolic water or their....reduce their metabolic rate by about 48 percent when they're on shore.

Jennifer Stock: Wow. We could learn some of these lessons from elephant seals.

Sarah Allen: Well, you know, there are a lot of studies into their physiology because it's trying to our own human physiology. It's so extraordinary by understanding extremes of physiology, you can have a window of understanding into the physiology of other mammals and, in fact, that you see they're taking elephant seals into the lab and putting them in MRI chambers and analysis. They're doing dive analysis to look at their brain and see what parts of the brain are functioning under these different behavior patterns.

Jennifer Stock: For those of you just tuning in or even listening, you're listening to Ocean Currents and my guest today is Dr. Sarah Allen from Point Reyes National Seashore and if you haven't guesses it yet, we're talking about the largest mammals that come ashore here in Point Reyes, elephant...northern elephant seals. So, one...going back to the breeding time of year when they're coming out here, there's some really interesting dynamics that happen. There isn't just a pair bond or anything like that going on. There are some dominant bulls that come on to shore and there's lots of fighting going on. Can you describe a little bit why is this and do they mate with just one female or what's going on on the shores there?

Sarah Allen: Well, mammals have all different sorts of mating systems and elephant seals have, I want to call it a hierarchical dominant mating system where you have alpha males and they're the most likely breeders with the females and they're....they fight for position next to where the females are. They're not fighting over territory, but they're fighting to be closer to the females and you'll have an alpha male and there may be some beta males around at the edges of the colony and then the ones way down the hierarchical chain will be on the periphery or maybe adjacent beaches and what's interesting in elephant seals...that hierarchical dominant system is what has forced this strong evolutionary adaptations of big nose, chest shield, which protects them when they're fighting, large canines, and large size.

All of those things are secondary sexual characteristics. Not the size....well, the size too. They're all geared towards the largest male being the most successful in mating and you see this with many males. Tuliuk is the terrestrial equivalent and so those males fight for position, but they don't spend a lot of time actually fighting. They spend a lot more time posturing, which I think is a window into all sorts of mammal societies.

Jennifer Stock: It's a big show.

Sarah Allen: It's a big show and actually the first thing they might do is just orient their body towards the rival that might be coming towards the females and just by orienting themselves that's enough of a threat to a younger male. If that doesn't work, then they'll raise themselves up, then they show their chest shield and their size and that should be enough, but if that's not enough then they'll trumpet and that trumpet is like no other sound. You picked up a bit of it on the tape.

Jennifer Stock: I think I might have some of it here and let me know if this is part of that trumpeting sound.

(Elephant Seal Sounds)

Sarah Allen: That's certainly the popping of the trumpet, called a trumpet to be kind, but really it's a popping noise. A friend of mine says it sounds like a single-stroke diesel engine.

Jennifer Stock: I want to mention, by the way, these sounds that I've been playing, they were...permission was given to me by the sound author, Jay Salter, and he is producing a CD that will be coming out soon. Some of these sounds will be on the CD called "Seal Sounding: Elephant Seal Soundscapes at Ano Nuevo," and I'll give out information on how to get in touch with him towards the end of the show, but thank you, Jay, for lending me these sounds that are such high quality. So, that's some of the trumpeting sounds or vocal...

Sarah Allen: They'll practice too.

Jennifer Stock: They're practicing...

Sarah Allen: They'll practice underneath or against hard surfaces. For example, at Point Reyes they'll go under the life boast station and practice against the timbers of the light boat station. It makes them sound larger or they'll trumpet against a big rock face. So, they're always practicing, especially the juvenile males.

Jennifer Stock: So, it's kind of like the teen years, lots of practicing going on of becoming more attractive, perhaps, to females, in the human species, that is. So, the females, are they watching all of this? Are they watching all these males and kind of taking notes along the way, who they think might be the best?

Sarah Allen: The females are more interested in each other and their pups and that's where they're putting their effort. They sleep a lot, they nurse,

they nuzzle their pups, and they fend off any rival males that might try and sneak up on them because they don't come into estrus until they're ready to ween that pup at around 30 days.

Jennifer Stock: So, the males are kind of getting ready for all this breeding while the females are like, "We're not even into that right now. We're working on taking care of this pup, getting her nourished," and so, it's kind of interesting that the males are totally just ready to go and the females are waiting until they're ready. Now, are their pups still around when they breed?

Sarah Allen: That's right. The pups are right there.

Jennifer Stock: So, there's a little danger in there with these little, fat weeners sitting around.

Sarah Allen: Well, once the pup is weener-size, it's pretty hard to injure it. They bounce more than they squish. So, you don't see mortality when a, very often, it does happen on occasion. It's...mortality is usually when a pup is very small because elephant seal pups cannot swim at birth. Harbor seal pups can, elephant seal pups cannot and so, wash out by storms is a big problem and that's why this year's been extraordinary because our weayjer has been so good. We've had up to date, very high pup survival or they get crushed in very crowded colonies by males, but that mortality by crushing is not a big issue for Point Reyes, it's more of an issue for a place like Ano Nuevo, which is really packed with seals. I think there are probably 8 or 9,000 elephant seals now at Ano Nuevo.

Jennifer Stock: Wow, on the island. How about on the Farallon Islands? There's a colony out there. Is it pretty packed out there?

Sarah Allen: Well, the Farallones is an interesting colony because it started in '72 and then it peaked out about ten years ago and what happened is habitat was degraded. One: they sand-flipped their sand away and elephant seals like to breed on sandy beaches. It's a way of thermo-regulating and sand-flipping is one of those ways of thermo-regulating. So, they sand-flip the sand away on the Farallones and also access to one of the major beaches was damaged during...or altered during the storms in '97, '95 and '97 and '98 during the El Nino years.

So, their access to one of the major breeding areas was changed. They couldn't get there.

Jennifer Stock: That's interesting.

Sarah Allen: Those animals shifted to Point Reyes and we could see a bump in the numbers at Point Reyes when that happened.

Jennifer Stock: And so...and at Point Reyes, they seem to be concentrated in certain areas and now are they expanding their range in Point Reyes right now?

Sarah Allen: Indeed they are. They are expanding from the main colony, which is on the front of the headlands to adjacent beaches at Drake's Beach in an area called Chimney Rock Beach and on South Beach, part of the great beach. So, they're filling in pocket beaches and they're forming these larger colonies and this year, there was a female and pup that was born about halfway between Chimney Rock and Drake's Beach.

Jennifer Stock: Oh, interesting. So, what type of management implications does that leave for the park if they're expanding their range and other habitats? And this is an area shared with snowy plovers.

Sarah Allen: That's right. Elephant seals are...a male can be up to 5,000 pounds and a snowy plover is about 60 ounces.

Jennifer Stock: A little ping-pong ball.

Sarah Allen: Yes, they do feed on the ectoparasites around elephant seals. So, I think that's an interesting relationship, but yes indeed elephant seals would probably displace snowy plovers that are nesting on those beaches in the northern part of the Great Beach and that would be a concern to us. In fact, I talked to National Marine Fisheries Service because there are probably more elephant seals now than there were historically or prehistorically. Prehistorically they were considered limited to just islands because we would've had a major predator here to prevent them from being on these large stretches of sandy beaches.

We know they were at the headlands and those are inaccessible beaches, but those big, sandy beaches like Limantour and Drake's and the Great Beach probably were not accessible because there would have been this large predator and that predator was a grizzly bear. We don't have them now and we're not likely to re-introduce them.

Jennifer Stock: That's right. So, that's one of the ways they're increasing, but in the water they have some significant predators.

Sarah Allen: Not enough to have an impact on the population growth, though, because of the growth rates that we're seeing, but indeed, white sharks are a major predator and they are able to prey primarily at these axis points where seals come in to breed at these colonies and these colonies are limited to only a few in the world. There are only a handful of places in the world where northern elephant seals come on shore to breed. So, a white shark doesn't have to be a rocket scientist to figure out where those places are. They're not going to find elephant seals in the wide open ocean, but they can see them where they're constrained to where they haul out on these colonies.

Jennifer Stock: So, would there potentially be white sharks hovering around the breeding colonies this time of year? Most of them are on the beaches, but some of them are coming into the surf. Would they be around this time of year?

Sarah Allen: Yes, they would be and in fact in the Farallones, this is when the highest mortality of seals occurs and shark attacks is during the winter months. Fall, when there's a high molt...excuse me, juvenile haul-out and high when the elephant seals are weened.

Jennifer Stock: Wow.

Sarah Allen: But an adult seal, we've seen adult male seals, which can be up to 16, 18 feet long, with large shark bites out of them.

Jennifer Stock: Yeah, one time I was on the Farallones helping out some sanctuary research and we were coming off the island on the crane. You know, you're just holding on. There's nothing holding you on. You're just holding on and you're standing over the water and right below me was a large, male elephant seal carcass without a head. That was pretty reassuring just thinking I'm hovering above this water here hoping that that crane would hold out.

Sarah Allen: There was an elephant seal skull or head found in a white shark that washed in at Limantour Beach about ten years ago.

Jennifer Stock: Oh my gosh. They're out there.

Sarah Allen: It's a good way to disable your prey is by biting its head off and in fact, there was a study looking at where the seals are attacked and elephant seals and harbor seals have their heads bit off or their rear flippers bit off or the rear area because those are the ways...well, the rear flippers for propelling themselves through the water.

Jennifer Stock: So, actually, do their rear flippers help them much as far as swimming goes? I thought they mainly used their fore flippers for swimming.

Sarah Allen: That would be sea lions.

Jennifer Stock: Oh, sea lions.

Sarah Allen: Elephant seals and harbor seals primarily propel themselves through the water with their rear flippers in a kind of sculling motion of back and forth and their front flippers, which are short and stubby, are used for, kind of, steering a little here or there. It's not their primary means of propulsion. It's a pelvic thrusting back and forth.

Jennifer Stock: Okay. Well, we're coming up to about halfway through this show. Let's listen to some more sounds before we take a break.

(Elephant Seal Sounds)

Jennifer Stock: ...and you're listening to KWMR, Point Reyes Station and Bolinas. This is Ocean Currents. My name is Jennifer Stock and my guest today is Dr. Sarah Allen and I wanted to let you know the sounds you've been listening to were generously allowed to be played today by Jay Salter, a sound recordist who records sounds and nature for visitors centers and natural history museums. This sound is part of an album that will be released in a few months for purchase called, "Seal Sounding: Elephant Seal Soundscapes at Ano Nuevo." You can find out more about this CD by calling Jay at 831-429-5836 or by website at www.aldersong, A-L-D-E-R S-O-N-G dot com. So, thank you, Jay, for sharing these sounds. I'm going to listen to a few more and Sarah is going to tell us what we're listening to.

(Elephant Seal Sounds)

Jennifer Stock: So, Sarah, what were some of the sounds that you were hearing in there? And we could play this track again if you want to go through them if you want.

Sarah Allen: Well, the high-pitched noise is the pups and it sounds like a monkey or chimpanzee kind of squealing. That's the pups and the warbling noise is a female vocalizing back to the pup. When she's agitated with a female nearby or a male, she might growl, which sounds like she's inhaling air through her nose and has a bad cold and then that popping noise are the males that are trumpeting. So,

there's a real cacophony of noise that goes on on these colonies which is in great contrast to a harbor seal colony or a sea lion colony, very different noises that you hear on these locations. It's really quite remarkable.

Jennifer Stock: Yeah and these sounds were recorded at Ano Nuevo where people go on tours and they take you right around and you're right up close with them as opposed to the shores here at Point Reyes. You're up a little bit higher, a little bit more protected I'd have to say as well because these animals can be quite aggressive. So, what are some tips you'd have if someone happened to be at the beach and they encountered an elephant seal? What should they do?

Sarah Allen: Well, it won't be unusual for you to encounter an elephant seal on some of these beaches, particularly this time of year and you'd likely run into a male, a young male that doesn't have any status and he's resting on shore. He wants to try again, especially when the female is coming to estrous and they look like a log on the beach. They'll be pretty high up on the beach and you might even stumble into him not realizing what's there because they're resting. They're sleeping.

Remember, they're diving continuously when they're at sea. So, when they come on shore, this is their break. They're resting. It's all about saving energy and for what the real thing they want to do, which is mate. So, when you come across one, try to keep about a hundred feet away. One, you don't want to alter their behavior, but two, you don't want to get bit by one because they can be unpredictable, particularly the large males, the young males that are like teenagers. They have no status. You are the lowest one on the totem pole for them or another thing that might happen is you might come across a colony.

We usually have signs up along the beaches where the colonies are, but you may run across a female with a pup in an odd place, in which case, again, you should give them about a one hundred foot distance so that you don't alter their behavior. Females can be more aggressive than males because they're defending their pups.

Jennifer Stock: So, last year, this is interesting, last year in March, so, about the time when weeners are trying to make their way out, I was hiking down around Coast Camp area and it's a beautiful sunny day and all of a sudden an elephant seal rolls out of the surf and I felt so bad because it obviously didn't look like a very good swimmer, It just basically rolled on out of the beach and hauled itself up. Is that

probably a weener trying to learn how to swim or...it just seemed to be so far away from the colony.

Sarah Allen: Well, it depends on the size of the animal. Starting in March, that's when you get the juveniles coming back to molt, and they molt in odd places too. They usually molt at the main colony, but ones that are yearlings that were born the previous year and are now coming back to molt can show up in places like Coast Camp and remember what I said, how new colonies get formed? Well, that's how they get formed.

So, you may have a juvenile that hauls out there and is going to go through the molt and it looks like a good place to it because it's a nice sandy beach, but if it gets disturbed enough then it won't stay. It'll move on to another beach.

Jennifer Stock: So, when weeners are weened, they're no longer feeding off their moms. How do they learn to swim and how do they learn to feed since they don't get that education from their parents?

Sarah Allen: No they don't, but, you know, they're pretty smart. They steal milk from other females. That's one way they feed and you'll get what we call super-weeners or tick-weeners because they're so fat they can use their flippers to move, but once there are actually no females around and they're starting to live off that body fat, they're getting hungry, and they start going in the water and what we've noted at Point Reyes is they'll start going in the water at night and then come back during the day and a lot of animals in the marine system feed at night because prey comes to the surface at night and either they're hard-wired to understand that or they learn that.

They start that sort of schedule of feeding at night and then resting onshore and within 30 days, they're at sea. We don't know how they learn. We can just assume that one, they're probably hard-wired to do that and then that first year is very high mortality. You can have up to 50 percent mortality that first year of those animals and after that, mortality drops way down because they have figured out where to feed or they've followed individuals and I was talking to a researcher and he felt that these animals were quite individual in their feeding habits until he started overlaying the tracks, the satellite-tagged tracks of them, and he said lo and behold, they're right on top of each other. So, he's wondering if there indeed is not a lot of exchange of the animals when they're at sea. To me, that makes a lot of sense because one, they're so social when they're on shore.

Why can't they be social when they're at sea even though they're feeding not on schooling fish. They're feeding on more solitary fish like sharks and skates and rays, but why can't they feed in the same area? And that's what he thinks now. One time at Point Reyes Headlands we had something like 50 juveniles arrive on a beach at the same time. This beach happened to be a parking lot.

So, we had to deal with it, but in my mind it was interesting because they all figured it out at once. Why that? Why all at once? There had to be some form of communication amongst them to arrive in the same place at the same time.

Jennifer Stock: Interesting. So, they're eating some rather large fish. Sharks, skates...

Sarah Allen: Yes, large fish

Jennifer Stock: ...squid?

Sarah Allen: Squid is a big one. Particularly for females and what I find interesting, most of these fish or prey are not what you would find on your plates...maybe squid, but skates, rays, hagfish...

Jennifer Stock: Ratfish too, right?

Sarah Allen: Yes, yes. These are things that are found in the deep ocean, the depths of more than a mile deep or up along the continental shelf of the Kenai Peninsula. They also feed on rockfish, but these are not things they're in competition with commercial fisherman or sport fisherman, such as California sea lions and harbor seals are constantly in fisheries interactions, but elephant seals are not and they're feeding on these animals...there was a study done looking at their dive patterns, again, with these gadgets that they can look at the dive patterns, and they identified four to five different dive patterns.

One is the animals go straight to the bottom and stay on the bottom and so they're probably digging around for rocks, where rockfish are and I think that big nose is used for a lot more than just trumpeting. It's a big muscle and it could be that they're pushing rocks or pushing bubbles into crevices, forcing fish out and this was seen with weddell seals down in Antarctica where they blew bubbles into the pack ice, forcing fish out of the crevices and I think that that's a possibility. It's pure speculation, but that big nose has got to be used more than just trumpeting and it indeed has a lot of scrapes and scars around the end, not from fighting.

Jennifer Stock: Wow, has anyone put a camera on an elephant seal to see what they're eating because one of the things I'm fascinated by is the prey they're eating are all really big and I'd love to see this predator-prey interaction with some of these big animals.

Sarah Allen: Well, they're starting to, but it's hard, one, because the depths are so deep to film and to capture if, you'd have to have a light and a different light source, infrared, to use. I've seen it on sperm whales, but that was a big camera and I don't think they've gotten the gadgetry small enough to do it with elephant seals and be effective, but I would expect it will be very shortly that they get to that level.

Jennifer Stock: Wow. That would be amazing. So, would that be the males only that would be flipping around rocks with their nose since they have that big proboscis or do females....they have a pretty big pointy nose...

Sarah Allen: They have a....

Jennifer Stock: ...as well.

Sarah Allen: ...pretty big nose. Females are speculated to feed mostly on squid or hake because they're feeding more in the water column and not on the bottom. There are females that feed on the bottom, but the studies that have been done by the researchers out at UC Santa Cruz show females mostly going into this transition zone between currents and what one researcher described to me, they attach a mechanism that...or a gadget, that...I have to say gadget because I don't really know the name of it. It's a temperature sensor and so they can measure real-time temperature of the water and what they found is the female might be swimming along and then she'll hit a change in temperature, which would be equivalent to a transition zone between two water masses and she goes down the face of it like she's going down a cliff and she goes down about 700 feet or 1,000 feet and then stops.

So, she's not even at the bottom. She's in the midwater zone and she's feeding there and the species that are more likely to be concentrated are squid in that location. So, they're speculating that they're feeding mostly on squid.

Jennifer Stock: Do they sense that temperature with their nose area, their whiskers, because with all that fat, all that blubber, it would be kind of hard to tell the temperature difference. Don't you think?

Sarah Allen: Well, thermo-regulation is a big deal for marine mammals because otherwise they're going to freeze or overheat onshore. So, there's several places where they have a counter-current heat exchange system. Their big flipper, their rear flippers are probably the most important one for heat exchange, but also probably around the muscle or maybe the mouth even.

Jennifer Stock: So, they're not totally insulted. They have some...the counter-current adaptation to be able to sense the temperature. They're amazing animals. Absolutely amazing. So, what is Point Reyes focusing on as far as studying elephant seals out here? What are some of the questions you have about the population here that you've been trying to focus on?

Sarah Allen: Well, we have a long-term monitoring program that's tracking the population growth and expansion since it was established and we do this in coordination with all the other colonies. So, we tag about 300 pups born each years, as is...occurs at these colonies and we exchange information about tagged individuals and from tagging these individuals, we understand one, about the survivorship and how long they survive and what mortality occurs in the population. We also understand where the colonies, new colonies, might form and the sort of exchange that occurs between colonies.

So, for example, we were able to determine the source populations for the population at Point Reyes and it was primarily from the Farallon Islands, initially. Then it became more important from Ano Nuevo and now more animals are coming not from Ano Nuevo, but from this new area down in San Simeon. Animals from Point Reyes go to other places too and one of the longest-range that we got feedback was an elephant seal that showed up in the Komandorski Islands in Russia and that was a researcher, a Russian researcher, that told us about this animal that had been tagged at Point Reyes as a pup and had showed up on the Komandorski Islands for three years in a row.

Jennifer Stock: Wow. So, are you doing some tagging?

Sarah Allen: Yes.

Jennifer Stock: What type of tags...these are plastic tags. These are not tags that transmit...

Sarah Allen: No...

Jennifer Stock: ...to satellites, right?

Sarah Allen: ...these are little plastic tags that are about the size of my thumb and we put them in the webbing between the digits of the rear flipper and these tags are called cattle ear tags because they're used for bovines in their ears, but we've applied them to elephant seals and harbor seals. They're not a permanent tag, but they have a pretty good life span and then we also put a little dye mark on the animals so that we can track them through a breeding season and we do this so we can track alpha males and beta males within a colony and, again, we've been able to see movement between colonies within the breeding season.

So, males at Point Reyes might go down to San Simeon and hang out there for a couple days and then come back to Point Reyes within the breeding season and they can travel very rapidly between locations. From these satellite tag studies, researchers from San Miguel Island tracked males going from San Miguel to Alaska in two weeks swimming continuously. So, they could go down to San Simeon in a day and a half. Between Point Reyes and the Farallones, within three hours.

Jennifer Stock: So, I take it these tags are color-coded so that the scientists can communicate about who's showing up on which beach.

Sarah Allen: Yes. So, Point Reyes is pink and the Farallones is also pink because early on researchers thought the Farallones would be the center of the colony and Point Reyes was just a little sub-population to the Farallones, but it's actually been the reverse. Ano Nuevo is green and down in the Channel Islands they have two different colors, yellow and red and white is the San Simeon population area, Big Sur, San Simeon.

Jennifer Stock: Oh, okay. So, are there scientists for each of these colonies that are basically trying to identify all the tags and is there some type of exchange that you can all communicate through to find out who is where?

Sarah Allen: Well, thank god for email, yes. I can't believe I actually said thank god for email, but it's true. Email is our way of exchanging information right now and I send out a weekly report to the other researchers talking about our numbers and then if I run across a really unusual tagged animal, I'll say, "Hey, I just ran across this animal. Tell me about it." Then at the end of the season we try and send out that information. Plus, we send it to the National Marine Fisheries Service because they're the agency responsible for

protection of marine mammals under the marine mammal protection act. So, we...I don't go out there without my permit.

Jennifer Stock: Right.

Sarah Allen: I have a permit from the National Marine Fisheries Service to study the seals and with that, it authorizes me to tag them to put these dye marks. The dye is interesting it's Lady Clairol, blue-black. Lady Clairol give it to us free. They don't like to publicize about it, but they are very generous in giving us this dye and it lasts beautifully until the animals molt in the summer.

Jennifer Stock: It's hard to imagine they actually have a market for that type of dye outside of elephant seals, to tell you the truth.

Sarah Allen: Oh, it's a stunning color.

Jennifer Stock: Oh, lovely. So, actually, is there an elephant seal that has come up to Jenner recently?

Sarah Allen: We call him R1. R for Russian River and 1 because he's the only one and this male's been coming back there for about four years now. He came as an immature and now I think he's probably almost a bull and bulls are about 8 or 9 years old. So, he's an interesting male. He was attacking harbor seals, which occur at the Russian River mouth. He attacked a kayaker, or a kayak, a kayaker on a kayak and now that he's matured, though, and a bull, he doesn't chase the harbor seals so much. He just lies around.

Jennifer Stock: So, he's all alone.

Sarah Allen: It's interesting. You'll see individual...it's not just males, but it seems to be males that show up on these beaches and it's perhaps that they get imprinted on a beach which has got harbor seals on it. So, he's a little confused about the species that he belongs with. Normally, we'd expect him to be at Point Reyes or the Farallones, but he is hauling out at the right time, which is during the breeding season and during the molt, but he's not hauling out at the right place. This is also a possibility of a colony site.

Jennifer Stock: Interesting. It's going to be interesting to monitor that.

Sarah Allen: There have been other individuals there, but he's the most consistent. I went and put a flipper tag in him. So, we know it's the same individual year after year and he comes and molts, so molt after molt. So, he is the only one.

Jennifer Stock: Aw, well it'll be interesting to see where that goes in the next few years.

Sarah Allen: What I think is interesting is he's not aggressive towards the harbor seals anymore. He was when he was a younger teenager.

Jennifer Stock: Hey man! Accept me! I want to be with you guys...can kind of hear it. So, here at Point Reyes there are some great opportunities for people to observe this amazing behavior and right now seems like the best time to do it. What would you recommend for visitors and locals to experience elephant seals right now?

Sarah Allen: Well, there's several places where you can see them and I think some of the best places is this Chimney Rock north district, north Drake's Beach site. It's an overlook. You're probably about 100 feet away from the animals and you're looking down on them. So, you can really see them well. There's a lot of fighting there.

Last week, we counted over 300 seals and that included about 150 females. So, that's a great spot. If you want to see them even closer you can go down to the lifeboat station and on Sundays they have a show. You can get inside out of the cold weather and if it's raining that's even nicer and they have a little slideshow on elephant seals and you can hear them trumpeting under the lifeboat station or they will come up on the ramp. Now, these are the loser males, which we call, but you can see them very, very closely within 10, 15 feet because you're in the parking lot looking down on them on the ramp, which is unusual.

You can also on minus tides hike from Drake's Beach and see them along the beach going towards Point Reyes Headlands. That's another good place because as I said, individual animals show up on many of the beaches, but remember to keep your distance so that you don't disturb them. Remember, everything about them is saving their energy and for your protection.

Jennifer Stock: Of course and if people are interested in volunteering for the park, the park has a wonderful docent program as well. You want to give a little bit of information about that?

Sarah Allen: The docent program is really terrific. We started it about ten years ago because there were so many people that were drawn to these elephant seals and when you see them you want to get close. They're just fascinating. There are few places in the world where you see this much life activity of a large, wild animal. So, we set

up the docent program to educate the public, but also to serve as kind of the barrier between the public and the elephant seals so that people didn't try to get too close and we have a regular training program that starts in October or November.

We have about 50 docents and they work on the weekends and holidays to talk to you about elephant seals, answer your questions, and also to protect the seals. It's a terrific program and some of the docents that are working at Point Reyes used to work at Ano Nuevo and they were so enthralled by the whole thing at Ano Nuevo when they moved up to the Bay Area, they volunteered up here. They've been doing it for ten years. They're really dedicated and knowledgeable. They know a lot more about elephant seals than I do because they trained down at Ano Nuevo, which was a really exciting place to study elephant seals.

Much of what we know about elephant seals occurred at either Ano Nuevo or San Miguel Island because of these really, really extraordinary colonies.

Jennifer Stock: So, if people are interested they can...well, on the weekends there's a bus, there's a shuttle service. So, they would drive out to Drake's Beach parking lot and then there's a shuttle that goes to Chimney Rock?

Sarah Allen: That's correct. Yes.

Jennifer Stock: So, that's on the weekends and then weekdays you can drive to Chimney Rock and observe on your own, but there won't be docents there on the weekdays?

Sarah Allen: No, there won't be, but one nice thing about Point Reyes in contrast to Ano Nuevo is you can go any time. You're not restricted to going out there and spending as long you want. You're not forced to be into...because there's so many visitors at Ano Nuevo, they have to do people management and we're not forced in that position up here. Another terrific place to see elephant seals is San Simeon and as I said, this is a newer colony.

You pull into the parking lot, right off of highway 1, and there they are.

Jennifer Stock: You almost have to watch yourself in the parking lot that you're not going to hit an elephant seal.

Sarah Allen: It is a most extraordinary colony.

Jennifer Stock: Well, also one of the benefits of coming to Point Reyes is because this is also gray whale migration time. So, folks can come out and visit and see gray whales migrating as well. That's pretty amazing. There's not very many places on the planet where you can go to observe this wildlife. It's pretty stunning that it's all right here. It's what made Point Reyes quite attractive to me.

Sarah Allen: Well, and there are other species of pinnipeds around the headlands too. You can see California sea lions, steller sea lions, and harbor seals and on occasion, a northern fur seal. So, there's a lot of activity at Point Reyes Headlands. It is a peninsula. It's almost like an island. It's almost like the Farallones because you have seabirds nesting, you have a lot of this wildness of the ocean because you're sticking out in the ocean and you've got peregrine falcons diving around. It's really quite an extraordinary place.

Jennifer Stock: We're so lucky. So, our harbor seal season will be coming up in a couple months. So, we trade off with the elephant seals and harbor seals then have a breeding season and you lead a docent program for that as well. So, can you tell us a little bit about how people might be able to get involved with the harbor seal program?

Sarah Allen: Well, we have a program for monitoring harbor seals just as we do for elephant seals and that starts, the training starts in early March. So, if you're interested in that, you can check out the Point Reyes National Seashore website or you can call me up at the Parks Service at 415-464-5187 or email me, Sarah_Allen@nps.gov and we do a three-day training and fieldwork. There's in-class training and several visits in the field. We have a mentoring rogram.

We've been doing this for more than ten years and we have volunteers who've been doing it for more than ten years who are mentors to new surveyors and then NOAA Sanctuaries Program, the Farallones National Sanctuary Association, has a docent program where they intervene with the public and educate the public about harbor seals and that's a terrific program. We work together in studying and protecting these populations and one of the nice things about Point Reyes is, again, it's got one of the largest harbor seal populations in the state. There are about 20, 25 percent of the population of harbor seals, of California here at Point Reyes and so it's a great opportunity to see them and you can just drive along highway 1 in Bolinas and see them hauled up right there and that's where one of the NOAA sites is, a docent program.

Jennifer Stock: That intervention is so key. The education...so many people don't realize that just taking a step too much closer to the seals can really hurt them and hurt their behavior and their energy loss. So, it's nice to hear that these folks are working together to educate those of us. So, we just have a couple more minutes and Sarah, I'm kind of dying to know from all of your field research if you have a favorite elephant seal story from your time in the field. Something you may have observed or, I don't know, retreated from. Maybe it...

Sarah Allen: There are lots of wonderful stories, but I think the most extraordinary is if you ever see a birth of any animal, but to see a birth of an elephant seal is really quite extraordinary and it happens faster than you realize. Sometimes the gulls know before you do. I've seen many births and every one is just as exciting as the last and I've only seen one stillbirth. So, mortality at birth is quite rare, certainly at Point Reyes, and pups can be born head first or tail first. It doesn't matter because they're born on land and when the pup is thrust out, I mean, it just explodes out of the female and the amniotic sac breaks and the first thing that female does is spin around and start nosing and warbling at the pup and the pup gasps and starts that mew sound.

It's really quite extraordinary and they're glistening from the amniotic fluid and then the gulls are right in there trying to go after the placenta and the amniotic sac and the female is so protective. It's really quite extraordinary.

Jennifer Stock: That's wonderful. You probably get to witness that every year to remind you of your love for those animals.

Sarah Allen: I think to see a birth of any animal is a most extraordinary opportunity and you can go there and hang out for three hours this time of year and you'll probably see a birth and that's the other thing, is there are so many females there pupping that your opportunity to see a birth are much higher. I took a group out on a field trip two weeks ago and I said, "I promise you, I'll find a birth, I'll find a female that's going to give birth," and it took an hour and a half, but there it was. We saw a birth.

Jennifer Stock: Nice. Well, thank you so much, Sarah, for being a regular on KWMR. It was wonderful to have you here today and for those of you that haven't made the trip out to the headlands, I highly encourage it at this time of year. It is just astounding. There's so much going on and you'll be wowed by whatever behavior you might be able to witness. I wanted to leave you with one announcement of an opportunity to get out on the water and see

gray whales. Farallones Marine Sanctuary Association is hosting a whale watch on April 29th and you can go to Farallones.org or call 415-561-6625 to sign up to get out to see some gray whales that might be going through in April, April 29th.

So, we've been listening to Ocean Currents. My name is Jennifer Stock and Sarah Allen has been my guest and you'll be able to catch an archived show or a podcast of this show at cordellbank.noaa.gov in a week or so as I am able to get this file up there. So, thank you for joining us today.